

Should the conglomerates on the two continents prove to be stratigraphically identical, they will furnish excellent bench-marks for working out the comparative geology of the two regions.

Examples of the striated stones from Wooragee, are placed in the Technological Museum for inspection.

ART. IV.—*On the Fungi Growing in Mines.*

By HENRY THOS. TISDALL, F.L.S.

[Read May 12, 1887.]

PART II.

In accordance with my promise, I visited Walhalla during the Easter holidays, in order to secure some fresh specimens of Fungi from the Long Tunnel Mine. Mr. Ramsay Thomson, the manager, gave me every facility for exploring the mine ; but warned me that the fresh timber and increased ventilation would greatly impede, if not entirely destroy, my chances of success.

I arrived on Thursday afternoon, and as the next day would be a holiday, Good Friday, I was only allowed to visit number three level.

This tunnel was dry and very warm, and I found the managers assertion was quite correct ; for instead of having to stoop or almost crawl, as formerly, amongst half rotten timber, crushed down to less than three feet by the superincumbent rock masses, I found upright seven-foot posts supporting a good roof, the whole being well slabbed and made very comfortable for every one except myself, as, alas, fungi were apparently things of the past. After traversing nearly a thousand feet of the level, I was rewarded by finding a partly deserted nook, with roof and sides fairly covered with fungi. Hyphomycetes hung from the cap timbers, their fleecy masses taking innumerable shapes, the commonest being like a huge pear made of snow, hanging by a long thin dark stem. Amongst these I discovered a very pretty agaricus ; it hung from the roof by means of a number of fine thread-like fibres, springing from about the

centre of the pileus ; these fibres join in one string, and are fastened to the partly decayed roof. The pileus was a pure creamy white, flattish, but the margin turned downward and then inward, margin not even, but bulging in separate lobe-like sections. In other specimens, the campanulate form, with a fairly even edge, was common. The lamellæ, at first a beautiful light orange, afterwards becoming brown ; the gills were decidedly forked, fleshy, shallow and separated. These characteristics would place them amongst the genus *Cantharellus* Fe.

As I quite agree with the remarks made by our President at the last meeting, namely, "That the main object of an outlying Society, such as ours, is more the obtaining of facts and placing them on record, than of merely theorising concerning them," I am quite content, therefore, to state such characteristics concerning fungi as I am in a position to describe, leaving the responsibility of classification to such veterans in science as Dr. Cooke or Professor Berkeley.

To return to our *cantharellus*, the fibres connecting the pileus with the timber of the roof do away with the use of the stem, which is accordingly absent, and its place is shown by a raised ring, similar in width and thickness to the lamellæ. The plant is generally solitary, but very often three or four grow so close together as to overlap ; and, in some instances, I discovered groups of several dozens springing from bundles of fine dark intermixed fibres.

A very curious hydnum was occasionally to be found hanging from the beams by innumerable fine silky hairs springing from all upper portions of the pileus, which consists of a rough whitish floccose membrane. The hymenium is spread over spines, which are cylindrical, or rather conical, very even, tapering towards the tops ; each of which ends in a circular plane. These spines grow rather crowded, and are of an orange yellow colour.

It might be supposed that at a thousand feet below the surface seasons would cease to influence plants, but I found that many fungi were either altogether absent, or their hard dry remains only left to tell the tale. I was very anxious to explore the lower and damper levels of the mine, so I went down at midnight after Good Friday. In the sixth and eighth levels I found many fungi that would not grow in the dryer atmosphere of No. 3. I was particularly struck with some lovely agarics growing in tufts from the decayed

remains of a hyphomycetes hanging from the roof, pileus campanulate, striæ very distinct, giving the edge a crenulate form ; so soft and brittle were they that I did not succeed in saving a single specimen ; however, I stood under an umbrella, up to my ankles in water, for nearly half an hour, to get a fair sketch of the plants with their surroundings. The lamellæ grow from the margin in two lengths, remote, white stem, almost translucent, long, attenuated towards centre, solid, with very short floccose hairs. In No. 8 level it was very wet, and fungi were to be found even on comparatively new timber. A semi-transparent polyporus is very common, hard, very uneven, all over knobs and excrescences, except where the hymenophorum appears, the pores are small, but deep and irregular, and the hymenium presents a bright orange, contrasting well with the browns and glassy grays of the matrix. Some of the slabs were almost covered with a creeping hyphomycetes, spreading out in all directions, in the same manner as lichens ; they are protean in shape, some as fine as threads, creeping in radial form from a somewhat thicker centre ; in other specimens the branches get wider and wider until they look like ribbons, but the ends of all invariably split up into very fine threads. The foregoing are formed of exceedingly fine soft silky fibres, which take root in the timber as they radiate, making it impossible to remove them without destruction. In one species the substance is thicker and the structure is not so soft and silky but rougher, almost corky, although still brittle. This fungus is covered with excrescences, and all the specimens I found were divided into three thick branches, each ending in knobs thicker than the stems ; the knobs were coloured brown, whilst the remainder was white with occasional brown patches.

Another distinct species was leathery, and peeled off easily from the post on which it grew ; the structure was floccose, and all branches ended in from three to five pointed ends, even in the very young plants the clavate endings were distinctly visible. I noticed that the timber most liable to the attacks of fungi was that of the messmate (*Eucalyptus Obliqua*) easily recognisable by its bark. I should mention that the clavate endings were of an elongated cone-shape, white, and velvety to the touch, but much firmer than the rest of the plant. In a very wet part of No. 8 level the rotten timber produced a very pretty agaric, pileus campanulate, of a light lavender colour, striæ well-marked,

making the edge of the pileus uneven. The stem long, solid and firm, the lamellæ white and remote. I was so impressed with its likeness to the agarics, which I found on the decayed hyphomycetes in No. 6 level, that I went back to compare them, but the colour, general shape and mode of growth are so different that I am convinced they are a separate species, though both evidently belong to the genus *Agaricus Mycenæ*, as the spores are white, the form campanulate, margin straight, and stem cartilaginous. In No. 8 level I found some very poor half dried specimens of an exceedingly curious fungus, no living ones could be observed anywhere. Mr. Thomson has forwarded me some since, and I have examined them minutely. They grow in bunches, like wire grass, hanging down from the cross beams as long branched fibres. The stems are solid, varying from $\frac{1}{8}$ inch in diameter to mere threads. The cross section is nearly circular, flattening slightly where the stem branches, which it invariably does dichotomously. The mode of branching is peculiar; the stem becomes thicker and flatter, then stops short, and the twin branches sprout from each side, widening abruptly. The substance of the plant, as revealed by the microscope, is floccose, the fine hairs being closely pressed together. A thick, very dark purple bark surrounds the stem, this becomes brittle when dry, and sometimes scales off. At the tips of the branches the bark ceases, and a light coloured fleshy substance appears; this is quite white in the living plant, and is crowded with tiny spores, fastened like bunches of black grapes. The form of this fungus seems to me to bring the algæ and fungi into very close relationship; it looks exactly like seaweed, as it hangs from the roof, floating loosely in the air.

Some years ago my attention was drawn by a miner to an extraordinary vegetable production growing in No. 3 level, at the base of some rotten slabs; being anxious to watch its growth, I would not remove it, and I determined to copy it *in situ*. I obtained four candles, placed them on the ground with the flames touching, then I lay down at full length on the dry floor of the drive, and after a couple of visits, obtained a faithful, if not artistic copy of the fungus. The main portion of the plant was stiff, I might say leathery, and this was crossed by girdles made of fine white silky hairs, each of these hairs was dotted all round with spores. I visited the mine several times to examine the fungus, and as it seemed to retain its original form, I at

length intended to remove it out of danger, but I had delayed too long; the ruthless foot of some passing miner must have kicked it from its hiding place and I saw it no more. Since then I have diligently explored, but was never successful in finding another specimen. A miner brought me a species of clavaria, which he said he had picked off a post in No. 3 level, but I have never been able to find one of that particular kind myself.

Many kinds of club-shaped fungus have been found by me in the mine, but I have not been fortunate enough to get sufficient data in the shape of spores, &c., to determine their proper classification. However, Baron von Müller has kindly promised to send the specimens to Europe, with my notes thereon, and doubtless, in a short time I shall be enabled to append a full and correct list of them, with descriptions in the Transactions of the Society.

I have questioned the miners concerning luminous fungi in the mines, but they say they have never seen any; this is singular, for agaricus candicans is very plentiful in the neighbourhood, and Humboldt is quite enthusiastic as to the splendour of some luminous species in mines. In fact, that is the only mention I have seen of fungi in connection with mines. Another curious proof of nature's modifying her apparently fixed rules, is exemplified in some of the agarics and hydnei which I found. The rules amongst these orders are, that the hymenium should turn from the light, and that the stem, if any, should support the plant above it. Of course, there is no light except the passing candle of the miner, but the hymenium faces such as there is; again, the stems in these plants are suppressed altogether, and fibres from the top of the pileus support the weight which is placed below it.

Turning from the plants themselves to their effect on those who are brought in close and hourly contact with them, I may premise, by stating the well-known fact, that fungi are plants that imbibe oxygen and exhale carbonic acid, this alone would have a prejudicial effect on those working in their neighbourhood.

Professor Berkeley, speaking on this subject, in his "Outlines of British Fungiology," says, "Fungi were long regarded as the mere creatures of putrescence, and therefore, as the consequence, not the cause of disease, but almost everyone is now ready to acknowledge what a weighty influence they have in inducing diseased condition. Un-

fortunately, the fungi which occur in the diseases of man, have seldom been examined by persons intimately acquainted with these fungi, so that the species or even genera in question are often doubtful. It is, however, certain that many of those which are found on different parts of the mucous membranes of animals, in a more or less advanced stage of growth, are like the fungi of yeast, referable to common species of mould. It is not probable, that in these cases, fungi originate disease, though they frequently aggravate it. The spores of our common moulds float about everywhere, and as they grow with great rapidity, they are able to establish themselves on any surface where the secretion is not sufficiently active or healthy to throw off the intruder. Where the spores are very abundant, they may sometimes, like other minute bodies, obstruct the minute cells of the lungs, but there is no reason to believe that they induce epidemic diseases."

I may here remark, that I had not seen the foregoing paragraph when I first formed the idea that fungi spores might have something to do with the lung diseases common amongst miners, but whilst hunting up information on the subject, I came across this passage which certainly upholds my preconceived idea. The greater proportion of the fungi which I have been describing, are certainly closely related to the moulds referred to by Professor Berkeley; in fact, I have very little doubt that they are nothing but huge overgrown members of the same family, swollen to extravagant dimensions by the heat and moisture by which they are surrounded. In Dr. Cunningham's report of his "Microscope Examination of Air," conducted in India (1872), he says, "That spores and similar cells were of constant occurrence, and were generally present in considerable numbers. That the majority of cells were living, and ready to undergo development on meeting with suitable conditions was very manifest, as in those cases in which preparations were retained under observation for any length of time, germination rapidly took place in many of the cells."

With reference to the size of these spores, Dr. Cooke remarks, that "The largest spore is microscopic, and the smallest known scarcely visible under a magnifying power of 360 diameters." Taking into consideration the confined space in which miners must necessarily work, and the immense number of spores from such a quantity of fungi as

used to grow in the tunnels, I think we may safely take it for granted that fungi are, or were, deleterious to weak lungs. The next question then is how to get rid of them? The manager of the Long Tunnel at any rate has answered this question, to a certain extent, in a very practical way, for his repairs have nearly extirpated the fungi from some of the levels. But if we turn again to professor Berkeley's "Outlines," we find the following: "The rapidity with which spawn penetrates, and the depth to which it enters, is often quite surprising. The most solid timber in a few months will sometimes show unequivocal traces of spawn. I have seen, for instance, elm trunks which were perfectly sound when felled, penetrated by the end of the second year with spawn to within a few inches of the centre; and in this case it must be remembered that vegetation goes on in the trunk for nearly a twelvemonth before any fungi can establish themselves." Now it is simply absurd to suppose that a mining company could keep on constantly renewing timber to keep down these destructive pests. Several gentlemen belonging to our Society suggested painting the timber with certain acids, and I intended to try this plan at Walhalla, but my short stay prevented me; however, I have asked the manager, Mr. Ramsay Thomson, to paint certain marked posts with different acids, and so find out which is the best, and I have little doubt that he will accede to my request. The following remedies are mentioned by Berkeley—salt, lime, sulphate of copper, corrosive sublimate, and arsenic. If we are fortunate enough to hit on a really good and cheap remedy, we will not only be able to show how to extirpate an enemy to human life, but also to offer a premium to mine owners to use the remedy, for if the fungi in mines can be destroyed the timber will most certainly last twice as long.

ART. V.—*On the Production of Colour in Birds' Eggs.*

By A. H. S. LUCAS, M.A. Oxon., B.Sc. Lond.

[Read May 12, 1887.]

The question of the cause of the coloration of birds' eggs has often been referred to, but has not, to my knowledge, been adequately treated of in any work on Oology. Perhaps